



Appl. No. 10/731,018
Art Unit: 2871
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AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. – 3. (Canceled)

4. (Original/Withdrawn) A reflective liquid crystal display having a semiconductor substrate, a plurality of switching elements formed on the semiconductor substrate and electrically isolated from one another, a plurality of functional films formed one upon another over the switching elements, a plurality of reflective pixel electrodes formed on a top one of the functional films and electrically isolated from one another to correspond to the switching elements, respectively, storage capacitors provided for the switching elements, each switching element, each reflective pixel electrode connected to the switching element, and each storage capacitor for the switching element constituting a pixel, pixels being arranged in a matrix on the semiconductor substrate, a transparent substrate, a transparent counter electrode formed on a reverse of the transparent substrate to face the reflective pixel electrodes, and liquid crystals sealed between the reflective pixel electrodes and the counter electrode, the reflective liquid crystal display comprising:

at least two layers of light blocking metal films that are formed one upon another between the semiconductor substrate and the reflective pixel electrodes with an insulating film being laid on and under each layer of the light blocking metal films, to block part of color-image read light, which has been made incident from the transparent substrate side to the liquid crystals through the counter electrode and has penetrated the insulating film adjacent to the reflective pixel electrodes through openings formed between adjacent ones of the reflective pixel electrodes, from reaching the switching elements, the insulating film laid between the two layers of the light blocking metal films being a light blocking insulating film whose thickness is set to be equal to

or thinner than 400 nm which is the wavelength of B (blue) light contained in the color-image read light.

5. (Original/Withdrawn) A reflective liquid crystal display having a semiconductor substrate, a plurality of switching elements formed on the semiconductor substrate and electrically isolated from one another, a plurality of functional films formed one upon another over the switching elements, a plurality of reflective pixel electrodes formed on a top one of the functional films and electrically isolated from one another to correspond to the switching elements, respectively, storage capacitors provided for the switching elements, each switching element, each reflective pixel electrode connected to the switching element, and each storage capacitor for the switching element constituting a pixel, pixels being arranged in a matrix on the semiconductor substrate, a transparent substrate, a transparent counter electrode formed on a reverse of the transparent substrate to face the reflective pixel electrodes, and liquid crystals sealed between the reflective pixel electrodes and the counter electrode, the reflective liquid crystal display comprising:

at least two layers of light blocking metal films that are formed one upon another between the semiconductor substrate and the reflective pixel electrodes with an insulating film 10 being laid on and under each layer of the light blocking metal films, to block part of color-image read light, which has been made incident from the transparent substrate side to the liquid crystals through the counter electrode and has penetrated the insulating film adjacent to the reflective pixel electrodes selected from the group consisting of SiN and SiON.

6. (New) A reflective liquid crystal display having pixels arranged in a matrix, comprising:
a semiconductor substrate;
a transparent substrate that transmits light;

switching elements formed for the respective pixels on the semiconductor substrate and electrically isolated from one another;

first storage capacitors provided for the respective switching elements and electrically isolated from one another;

reflective pixel electrodes provided for the respective pixels and having first openings therebetween to be electrically isolated from one another;

a transparent counter electrode formed on a reverse of the transparent substrate to face the reflective pixel electrodes;

liquid crystals sealed between the reflective pixel electrodes and the transparent counter electrode;

first light blocking metal films formed between the semiconductor substrate and the reflective pixel electrodes for the respective pixels and having second openings therebetween to be electrically isolated from one another, wherein the second openings do not face the first openings, and the first light blocking metal films block at least part of light which is part of light which has transmitted through the transparent substrate and which has intruded into the first light blocking metal films side through the first openings;

normal metal films formed between the semiconductor substrate and the reflective pixel electrodes for the respective pixels and having third openings therebetween to be electrically isolated from one another, each normal metal film being electrically connected to a switching element and a first storage capacitor corresponding thereto; and

second light blocking metal films formed between the semiconductor substrate and the reflective pixel electrodes for the respective pixels and electrically isolated from one another,

wherein the reflective pixel electrodes and the first light blocking metal films are electrically connected to each other through first via holes; the first light blocking metal films and the normal metal films are electrically connected to each other through second via holes; and

accordingly each reflective pixel electrode is electrically connected to the switching element and the first storage capacitor corresponding thereto, and

wherein the second light blocking metal films are electrically connected to the first via holes and cover the second openings of the first light blocking metal films in order to prevent the light which has intruded into the first light blocking metal films side through the first openings from reaching the switching elements through the second openings.

7. (New) The reflective liquid crystal display according to claim 6, further comprising:

insulating films formed between the first light blocking metal films and the second light blocking metal films,

wherein the insulating films serve as second storage capacitors.

8. (New) The reflective liquid crystal display according to claim 7, wherein thickness of the insulating films is set to be equal to or thinner than 400nm.

9. (New) The reflective liquid crystal display according to claim 7, wherein the insulating films are made of a material selected from the group consisting of SiN and SiON.

10. (New) The reflective liquid crystal display according to claim 6, wherein the second light blocking metal films are made of a material selected from the group consisting of TiN, Ti, and layered TiN/Ti.

11. (New) A reflective liquid crystal display having pixels arranged in a matrix, comprising:

a semiconductor substrate;

a transparent substrate that transmits light;

switching elements formed for the respective pixels on the semiconductor substrate and electrically isolated from one another;

storage capacitors provided for the respective switching elements and electrically isolated from one another;

reflective pixel electrodes provided for the respective pixels and having first openings therebetween to be electrically isolated from one another;

a transparent counter electrode formed on a reverse of the transparent substrate to face the reflective pixel electrodes; liquid crystals sealed between the reflective pixel electrodes and the transparent counter electrode;

first light blocking metal films formed between the semiconductor substrate and the reflective pixel electrodes for the respective pixels and having second openings therebetween to be electrically isolated from one another, wherein the second openings do not face the first openings, and the first light blocking metal films block at least part of light which is part of light which has transmitted through the transparent substrate and which has intruded into the first light blocking metal films side through the first openings;

normal metal films formed between the semiconductor substrate and the reflective pixel electrodes for the respective pixels and having third openings therebetween to be electrically isolated from one another, each normal metal film being electrically connected to a switching element and a storage capacitor corresponding thereto; and

second light blocking metal films formed between the semiconductor substrate and the reflective pixel electrodes for the respective pixels and electrically isolated from one another,

wherein the reflective pixel electrodes and the first light blocking metal films are electrically connected to each other through first via holes; the first light blocking metal films and the normal metal films are electrically connected to each other through second via holes; and

accordingly each reflective pixel electrode is electrically connected to the switching element and the storage capacitor corresponding thereto, and

wherein the second light blocking metal films are electrically connected to the second via holes and cover the third openings of the normal metal films in order to prevent the light which has intruded into the first light blocking metal films side through the first openings from reaching the switching elements through the second and third openings.

12. (New) The reflective liquid crystal display according to claim 11, further comprising:

insulating films formed between the second light blocking metal films and the normal metal films.

13. (New) The reflective liquid crystal display according to claim 12, wherein thickness of the insulating films is set to be equal to or thinner than 400nm.

14. (New) The reflective liquid crystal display according to claim 12, wherein the insulating films are made of a material selected from the group consisting of SiN and SiON.

15. (New) The reflective liquid crystal display according to claim 11, wherein the second light blocking metal films are made of a material selected from the group consisting of TiN, Ti, and layered TiN/Ti.